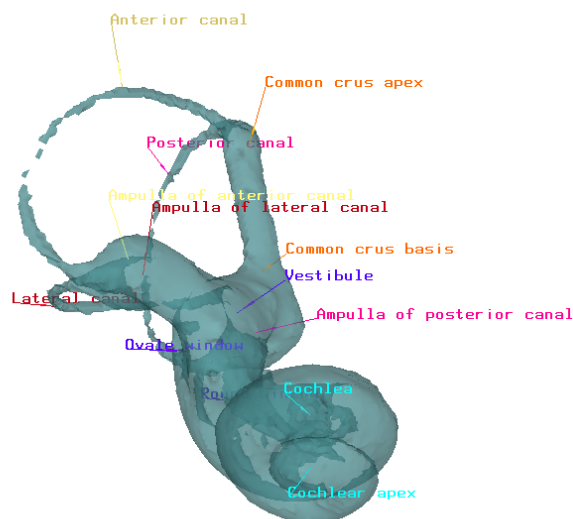# INTERACTIVE SOFTWARE: MeshTools

ISE-MeshTools Tutorials

Tutorial 04 : working with flags

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Tutorial 04 includes:

- One .vtk surface file representing a right inner ear of *Mus musculus*
- One .pos file
- One .ntw file
- One .flg file
- One .ori file
- The present .pdf document

Working with flags

Contents

1. About the specimen

The surface file enclosed in this tutorial represents the three-dimensional reconstruction of the right inner ear of a house mouse (*Mus musculus*) obtained by computerized microtomography at the MRI µCT platform housed at the ISE-M.

2. Tutorial

Before using this tutorial, I strongly recommend to download and read ISE-MeshTools User Manual, especially the "Interaction modes" and "Keyboard and mouse controls" sections.

2.1 Download and unzip files

Download and unzip the files associated to this tutorial in a folder containing no accent. Open ISE-MeshTools. Also, make sure that the path leading to the folder containing the tutorial files does not contain any accent. Otherwise, ISE-MeshTools will not be able to open the contained files.

2.2 A brief overview of enclosed files

2.2.1 Mouse right inner ear surface and position files

You may load the enclosed .vtk file (File -> Open Surface, then select "Mouse_right_ear.vtk"). When loaded this way, the corresponding opened surface object is drawn grey, which indicates that this object is selected. You may interact with selected objects in different ways (see ISE-MeshTools manual for further explanations). As a general rule, when opening a new object, I strongly recommend to change its position in order that it matches the 6 predefined camera positions :

When pressing " ", object should be viewed from right side.

When pressing " " object should be viewed from left side.

When pressing " ", object should be viewed from front side.

When pressing " ", object should be viewed from back side.

When pressing " ", object should be viewed from above.

When pressing " ", object should be viewed from below.

Once correctly positioned, you may save the object's current position (File->Position->Save Position).

The present tutorial contains a .pos file, which you may load in order to place correctly the right inner ear (File -> Open Position, then chose "Mouse_right_ear.pos"). As we plan to place flags outside as well as inside the inner ear, we will select the right inner ear and change its transparency (Edit Selected Surface->rendering modifications->Set Alpha Value -> then give a value smaller than 100).

You can unselect all opened objects by pressing "CTRL +D", or select all objects by pressing "CTRL +A". You can delete all selected objects by pressing "Del".

2.2.2 Mouse right inner ear project file

The present tutorial contains a project .ntw file, which may be useful to directly open the inner ear in a convenient position and to render it transparent. First, delete all currently opened objects (press "CTRL+A", then press "Del"). Then open the enclosed .ntw file (File->Open Project, then select "Mouse_right_ear.ntw"). Once loaded, the mouse inner ear surface file object is opened, is given the position enclosed in the "Mouse_right_ear.pos" file, a colour and a transparency. Note that the newly opened surface is unselected.

2.2.3 Mouse right inner ear .ori file

The present tutorial contains a .ori file, which contain orientation labels for the coordinate system orientation helper. You can load this file the enclosed .ori file (File->Orientation labels, then select "Mouse_right_ear.ori"). Once loaded, the system coordinate orientation helper will show the following labels :

+z axis : superior

-z axis : inferior

+y axis : medial

-y axis : lateral

+x axis : proximal

-x axis : distal

You may set your own orientation axis labels with the "Edit orientation labels" window (Viewing opt.-> Orientation labels)

2.2.4 Set the background colour to black

I recommend you to set the background colour to black, which is more convenient to set flags in most cases ("Viewing opt.-> General colour and lightning options -> Background colour)

2.2.5 Set landmark and flag rendering options

Flags are rendered in MeshTools the following way : a conventional landmarks is placed at the location of interest and rendered; additionally, a line of a defined length is drawn between this location and the place where the label is rendered. Flag landmark selection / unselection is performed on the conventional landmark location (do not try to select / unselect the label or the line directly, this will have no effect). As the structure we investigate in this tutorial is quite small (around 4 mm long), I recommend you to set the flag length to about 0.5mm, and landmark size to a value smaller than 0.5mm (let us say 0.2mm). This can be achieved int the "Landmark and flag options" window (Viewing opt.-> Landmark and flag rendering options) .

2.2.6   Mouse right inner ear .flg file

Prerequisite : make sure that the mouse inner ear surface is loaded, that it is correctly positioned and transparent enough. You can load the enclosed .flg file (File->Tags and flags->Load flags-> Mouse_right_ear.flg), which contains 13 "flag" landmark.

2.3   Flag digitization with ISE-MeshTools

2.3.1   recommendations

When digitizing flags with ISE-MeshTools, I recommend to press " " to activate the "Landmark mode". When active, surface objects remain unselected when using the right mouse button. Then press   to activate the flag landmark setting mode.

Flag landmarks can be set on surfaces by pressing "L" + right mouse click. If a single flag landmark is selected, its position can moved on another part of the surface by pressing "L" + right mouse click (nothing happens if no flag landmark is selected or if more than one flag landmark are selected). Here, in some cases, we will need to move flag landmarks away from the object's surface (for instance when you want to place a landmark at the centre of a foramen): once selected, a landmark position can be moved by using the usual mouse (CTRL + middle click + mouse drag) and GUI controls.

2.3.2   Digitization strategy

To digitize flags on an inner ear, I recommend to use the following 3 steps strategy :

1) Digitize flag locations

By pressing "L" + left click repeatedly, you may digitize a series of flags on the structures you want to label. Flag label, length and colour will be defined ulteriorly.

2) Set flag labels 1 by 1.

- By defaults, flags are labeled Flag 1, Flag 2... Flag n. To edit flag labels, open the "Edit 1 Selected Flag" window (press).

- Then repeat the following operation sequence for all the flags you wish to edit :

   a) select the flag you wish to edit (1 and only 1 flag landmark should be selected).

   b) press "refresh"in the "Edit 1 Selected Flag" window. The label, length and colour should correspond to current state of the selected flag.

   c) edit the label (and optionnally the length and colour), and press Ok. The flag should become unselected

3) Modify flag colour and length group by group

 To edit the colour and the length of multiple selected flags at once, open the "Edit All Selected Flags" window (Edit selected landmarks->Edit all selected flag landmarks).

- Then repeat the following operation sequence for all the groups of flags you wish to edit :

   a) select a group of flag you wish to give the same colour and length.

b) change the colour and length.

c) press Ok. The corresponding flags should become unselected.

2.4   Saving flag landmark files

To save all flag landmarks, go in "File->Tags and Flags->Save flags".

3.   Acknowledgements

Thanks to the MRI imaging platform for the access to imaging facilities.